

CACTUS AND SUCCULENT JOURNAL

Of the Cactus And Succulent Society
Of America

VOL. V

JANUARY, 1934

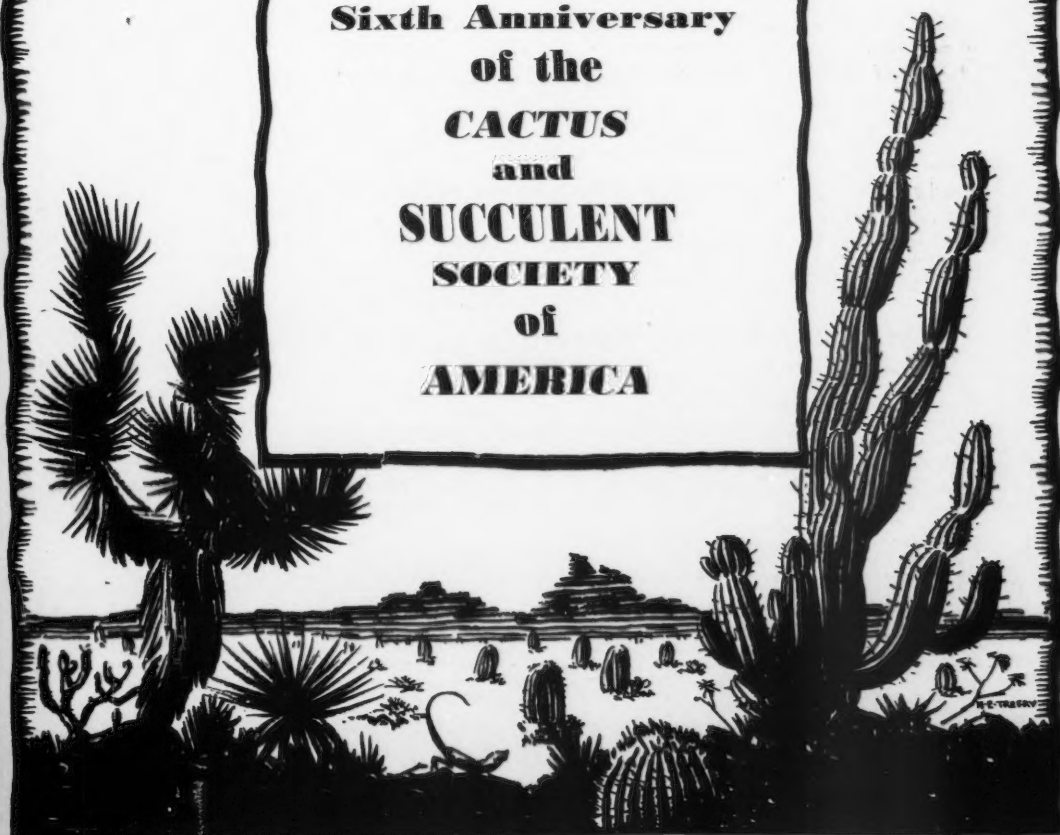
No. 7

January 1929

January 1934

•

**Sixth Anniversary
of the
CACTUS
and
SUCCULENT
SOCIETY
of
AMERICA**



CACTUS AND SUCCULENT JOURNAL

Published and Owned by

The Cactus and Succulent Society of America, 1800 Marengo St., Los Angeles, California

A monthly magazine to promote the Society and devoted to Cacti and Succulents for the dissemination of knowledge and the recording of hitherto unpublished data in order that the culture and study of these particular plants may attain the popularity which is justly theirs. "The Cactaceae," by N. L. Britton and J. N. Rose, has been adopted by this journal for purposes of identification. (Membership and subscription \$3.00 per year, foreign \$5.00 per year.) Mail membership application and subscription to the Secretary, Ted Hutchison, 1800 Marengo Street, Los Angeles, California. *Managing Editor*, SCOTT HASELTON, 6162 N. Figueroa St., Los Angeles, Calif. *Advertising Manager*, G. A. FRICK, 1800 Marengo St., Los Angeles, Calif. *Editorial Staff*, JAMES WEST, 745 Fifth Ave., San Rafael, Calif.; ERIC WALTHER, 2667 McAllister Ave., San Francisco, Calif.; EDGAR M. BAXTER, Bellflower, Calif.

VOL. V

JANUARY, 1934

No. 7

CONTENTS

California Cacti, IX Echinocereus.....	E. M. Baxter	499
Question Column.....		501
Illustrated Notes in the Crassulaceae, No. 6 Cotyledon teretifolia.....	Eric Walther	502
Neglected Echinomastus.....	J. P. Hester	503
Reprint from Britton and Rose THE CACTACEAE.....	Center	Section
A Contribution to the Knowledge of the Cacti of Mexico.....	Helia Bravo	505
Frick's Notes.....	G. A. Frick	509
What Grows Where.....	Mrs. John D. Wright and Anne Smith	510

Catalogues Received

Lester Rowntree & Co., Carmel, Calif. California Wild Flower Seeds and seeds of rock plants, succulents, etc. 5 x 8, 32 pages. Free.

Shiner Cactus Nursery, P.O. Box 2, Laredo, Tex. Many illustrations of cacti and succulents including the famous Blanc wood cuts. Besides illustrating unusual species of the Texas, the Mexican border, West Indies, Central and South America, there is a 10 page list of Cacti grouped and named as in The Cactaceae by Britton and Rose. 28 pages, 8 x 11, 25 cents.

Succulent Christmas Cards received by the Editor:

Dr. Robert Poindexter, photograph of a Stapelia printed as a greeting card.

Charles Gibbs Adams, photograph of his patio fireplace surrounded by live oaks.

Herman Becker, Brooklyn Botanic Garden. Photograph of cacti taken at the Worlds Fair.

James West, fifth of a series of wood cuts of succulents.

"Planting Lists for Southern California"

By Roland Stewart Hoyt, Landscape Architect. 289 pages 6 x 9 bound in boards. The Livingston Press, 421 E. 6th St., Los Angeles, Calif. \$2.00.

Although this book is not written for the succulent enthusiast, it will be of interest to any plant lover who desires to know what plants are adapted to special requirements. Plants are listed under the following classifications: Structural Form, Cultural Aspects, Purpose Adaptation, Ornamental Characters, Distinctive Qualities, Garden Assemblage, Planting Calendar and Compendium of Plants.

Many succulents are included in the lists, and, as Mr. Hoyt says, "At first I was prejudiced against succulents but now I recognize their value in landscaping and shall give them more consideration in the future." The one constructive suggestion is that the author correct many of the names of cacti in the next edition.

There is a crying need for a listing of all succulents and their adaption to various localities and this book is the first step in the right direction. Californians will welcome this book as an aid to their planting problems.

Order from the author or address Scott E. Haselton, 6162 N. Figueroa St., Los Angeles, Calif.

At Quinteros, a Pacific port in Chile, *Lemaireocereus litoralis* became so huge that the fishermen of that place tied their boats to them when conveniently growing along the banks.

Now that winter and rainy season is upon us, it is well to remind you that water dripping through a leak in the roof of your hothouse onto a potted cactus plant for even a very short time, will induce a rot infection and invariably destroy the plant.

A great number of *Opuntia* species secrete nectar from their glochids much more abundantly than from their flowers as is true with other plants. On some species this secretion is so abundant that it dries into a clear crystalline ball of sugar and remains intact for a long time, where there are no summer rains to wash it off.

In the year 1790, Willdenow in his SPECIES PLANTARIUM makes mention of twenty-nine kinds of cacti. In 1846 over 800 varieties were known. In 1880 there were fully 200 species recognized and described. Today it is estimated that about 6000 are known to botany, and the combined number of cacti and succulents would probably reach 25,000.

EDITOR'S NOTE

The next issue will contain three of the best articles that the Editor has received. These articles will interest amateur as well as the scientific minded. The new material that will appear in 1934 will interest a great number of readers. The Editor will appreciate experiences on culture from different parts of the country. This year will see the completion of Britton and Rose and a new Editorial Policy.

California Cacti

By E. M. BAXTER

IX Echinocereus



Photograph by Baxter

Photograph from Ivan Messenger, San Diego

Echinocereus mojavenensis in flower, April, 1933. Note that the stamens are tightly clustered against the pistil, a condition that probably accounts for the scarcity of fertile fruit. This plant is in the Ord Mountain district in a rocky canyon.

Echinocereus mojavenensis growing in the floor of a broad valley near 29 Palms. This small cluster has about 25 heads. In the center right is a skeleton of *Opuntia echinocarpa*, and in the background are Joshua Trees, *Clistoyucca brevifolia*.

Key to California species of *Echinocereus*:

- Flowers brick red, medium, petals stiff.....1. *E. mojavenensis*
 Flowers dark rose to purple, large, petals soft.....2. *E. engelmannii*

Echinocereus mojavenensis

Further distinctions may be made in color and characteristics of spines, manner of growth of stems, and altitudinal range, between the two California species of *Echinocereus*. In the only locality that I know of where the two species meet and are similar in appearance, the spines of *Echinocereus mojavenensis* are more slender and are tortuously twisted, while those of *Echinocereus engelmannii* are straight and quite heavy. The altitudinal range is quite distinct, *Echinocereus mojavenensis* is found generally above 4000 feet elevation and the other species considerably below that except in spots where the life zones meet under some unusual condition.

Stems of the species under discussion are

short, seldom twice as long as thick, and grow in immense compact masses. Plants of three hundred heads have been recorded. I have seen several with more than one hundred and fifty heads. The stems are ribbed, generally with about ten ribs, and these expand and contract with the wet and dry seasons in a remarkable degree. When winter approaches, the stems seem to lose an enormous amount of their juicy content in a short time, and remain so during the freezing season. With the coming of Spring the stems fill out to nearly cylindrical shape, providing rain falls.

Brick red flowers add an odd color to the selection of colors amongst the California cactuses. The outer segments of the flower are few

in number in two rows. They are red shading at the bottom into the green of the ovary; this latter is quite free of scales but is covered with areoles filled with inch long bristles. The petals are stiff and succulent, rounded at the tip and broad. The pistil is green, the stamens orange and pink and yellow at the base where they join the orange-yellow of the lower part of the petals. Altogether it is a striking flower. Flowers remain open all day and night for three or four days.

I have found plants of this species in the upper canyons of the Ord Mountain District south of Daggett, California; in the upper Mor-

ongo Valley canyons; and in the valley bottom south of Windmill, near the State border on the Las Vegas road. I have had it reported from as far west as the mountains above Big Bear near San Bernardino, and from various points in between there and the eastern border of the State. It is also found in similar elevations in southern Utah, Nevada, Arizona, and possibly in Sonora.

The plant is easy to propagate from small cuttings if kept very dry and planted in a granite and lime soil. Seeds do not seem to be very plentiful, fruit do not set very freely.



Photograph by A. B. Clayton, San Diego

Echinocereus engelmannii with 31 flowers open and 15 buds ready to blossom. Mr. Clayton, a color photography expert, has designated this as the most impressive bit of color seen in trips over all of our

deserts. He photographed this specimen in western Imperial County. The *Opuntia* at the left is as yet unidentified.

Echinocereus engelmannii

A hedgehog in royal purple is *Echinocereus engelmannii* in the Spring when its spiny body is blanketed with a gorgeous mass of purple flowers. No other desert plant offers as much color as this one with which most of us are familiar. Found, as it is, in Los Angeles, San Bernardino, Riverside, Imperial, Inyo, and San Diego Counties it has as wide a distribution in

the State as any other cactus. Where it grows it is generally found in great numbers of all ages of plants from small single headed seedlings to old clumps of nearly a hundred heads.

Different than *Echinocereus mojavensis*, this species sends its joints up from the base of the plant and does not form the compact mounds to be seen in specimens of the red flowering hedge-

hog; nor does it ever have the enormous number of heads. Stems of *Echinocereus engelmannii* will often grow along the ground for a foot and more before the head will rear itself upwards. Plants in an isolated colony at the foot of Mescal Canyon near the County Playground in the San Gabriel Mountains exhibit this prostrate characteristic quite commonly.

Spines vary in color from a dark blood red through red, orange, tan, yellow, to white. Most plants will have white spines mixed with one of the other colors, the whole plant having the same coloring but perhaps having others with other colors growing within a few feet. The color is soon lost when the plants are brought away from the desert into coastal gardens.

Flowers are large, softly silky in texture, deep purple to pink in color. They are borne on the side, near the upper part of the stem, turning upright to expose their yellow stamens and green pistil to the wind and insects for pollination.

There are no species closely resembling this one, the only trouble with identification coming from the various colors and thickness of its spines. In the Colorado and Mojave Desert areas the plants are similar. In the San Diego-Imperial Counties section stems are larger and spines correspondingly heavier. The specimens previously mentioned, from the desert canyon mouth of Mescal Canyon, have a very heavy bodied spine mostly tan in color and with only a trace of the second color in a few spines.

"Arizona Cacti"

University of Arizona Bulletin, Vol. IV, No. 3: Biological Science Bulletin No. 1. "Arizona Cacti" by William Palmer Stockwell and Lucretia Breazeale. Published by University of Arizona, April 1, 1933. 116 pages with halftones and colored plates.

This little volume is certainly a contribution of inestimable value to the beginner in the study of cactus. Forty-four pages are given over to keys so illustrated that they might well be used for a correspondence course in taxonomy. Every distinguished character differentiating Tribes, Subtribes, Genera, Subgenera, Series, and finally Species is ILLUSTRATED with a line drawing by Lucretia Breazeale.

A goodly percent of the species is illustrated by half-tones and the reprint of some fair color plates adds to the ease with which specimens may be identified.

Two unusual additions not commonly reckoned among the flora of Arizona are *Ratibunia alamosensis* and *Neomammillaria armillata*. All other species listed are those to be found in Britton & Rose, no new species being included.

Copies may be secured from the Director of Mailings, University of Arizona, Tucson, for twenty-five cents cash.

E. M. B.

QUESTION COLUMN

Editor's Note—It is a pleasure to renew this column and it is hoped that the members will use it. Send in your questions or your frank comments on any of the answers. In the next issue we will publish the number of replies received so let us all use this department as a clearing house.

Information wanted on the planting of *Euphorbia obesa* seeds.

What is the proper season? Spring.

What is the correct soil mixture? 1/3 screened leaf mould, 1/3 screened cow manure, and 1/3 screened soil or preferably decomposed granite if available.

How are seeds prepared for planting? Place a layer of cotton in a saucer, then pour water in saucer until cotton floats and is well soaked. Lay seeds on the cotton until they sprout, which will occur in about 35 hours. Then take each sprouted seed and deposit in a small dent in the seed flat made with a match making certain that the sprouted end of the seed is pointed downward, then cover gently with soil. This is the slow way, but results are certain.

Is any benefit derived from mixing Semesan with soil used for seed propagation? Yes—Semesan arrests the growth of algae on the surface of the soil to some extent, but not entirely.

Is oak leaf mould injurious to cacti? Oak leaf-mould is very beneficial to the Epiphyllanae tribe, and a small portion mixed in the soil for desert sorts promotes flowering.

Is the use of lime in soil used for Stapeleae advisable? The cultural hints in the new Sloane and White book on the Asclepiadeae are the results of years of study and experiments by the most able horticulturist of this group of plants. The authors have not used lime. We refer you to this work. See advertisement.

Can the soil in an out door garden be disinfected against mealy-bug and other insects without injuring the plants or removing the plants from the bed? Refer to Fricks article on the control of the Mealy-bug in the December issue of the Journal. This information, together with the control of ants should give relief from this pest.

If it is necessary to repot a plant during the dormant period, will the plant bloom the following season? Disturbed roots on any plant interferes with the flowering of same until re-established, but in Cactus and Succulents this does not mean that there will be a total absence of flowers since they are of a storage nature.



Cotyledon teretifolia Thunbg. app. x 0.3.

ILLUSTRATED NOTES IN THE CRASSULACEAE

By ERIC WALTHER

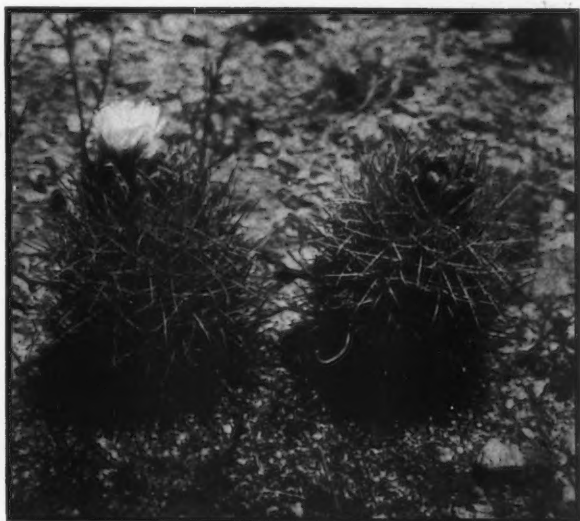
No. 6. *Cotyledon teretifolia* Thunbg.

When in 1828 DeCandolle established the genus *Echeveria*, he included therein 4 species. Of these *E. coccinea* and *E. gibbiflora* are clearly and well-known, *E. caespitosa* is now placed into *Dudleya*, but the fourth species, *E. teretifolia*, has long been a puzzle to taxonomists. This was due to the inadequate data on which DeCandolle based his characterization, as he had available only an imperfect illustration of a portion of the inflorescence; and some subsequent authors even doubted its being an *Echeveria*. (See Rose, North American Flora, 22:1:23.)

Further confusion arose when, under the unfortunate generic treatment adopted by Bentham and Hooker and others, *Echeveria* was reduced to *Cotyledon*, as there was another

Cotyledon teretifolia. However, the true *C. teretifolia* Thunberg is a South African plant related to the well-known *Cotyledon orbiculata* and quite distinct from all *Echeverias*. We take advantage of the opportunity presented us by the first blossoming of this species in local cultivation to show it here in picture-form. The charming species is quite distinct from its allies by reason of its narrow, subterete, obliquely truncate, closely hairy leaves. It should be noted that its leaves are all opposite, and that the inflorescence is strictly terminal; the large, nodding flowers are bright golden-yellow.

The plant shown was grown by Victor Reiter, Jr., from seed received through Dr. Johansen of Mrs. Vanderbyl.



Yellow flowered cactus designated here as *Echinomastus arizonica* known in collections as yellow flowered *Ferocactus johnsonii*.

Neglected Echinomastus

By J. P. HESTER

In 1931, when making a comparative study of Arizona's two members of this genus, *Echinomastus intertextus* and *Echinomastus erectocentrus*, I was surprised to find both species sharing several striking, if not generic characteristics or peculiarities of structure and growth not mentioned by Britton and Rose in their key to the genus nor in their descriptions of the individual species. I am presenting these observations in the hope that some one qualified to do so will study further in the genus. The additional features are these: all tubercles on mature plants have a short slot or groove on their upper side, extending from the edge of the spine-areole to their base or axil.

These grooves are similar to but usually shorter than those on many members of *Coryphanthanae*, and it is from the base of these incipiently woolly grooves that the buds emerge. No grooves, no flowers.

The low ribs on mature plants, usually 21 on *erectocentrus* and always 13 on *intertextus*, are composed of similar but not identically shaped tubercles that are peculiar in having the lower two-thirds of their length occupied by

rounded, twisted, sometimes rugose lobes.

Immature plants have plain, staggered tubercles, not arranged in ribs, nor are they equipped with lobes and felted grooves.

The ribs on all mature plants spiral more or less right or left, from bottom to top, in the direction opposite to that in which the lobes of tubercles are twisted to connect with the nearest axil below them, which is always the same direction on a given plant.

The first buds on the plants of both species are from the axils in the woolly grooves of the youngest tubercles with mature spines, presumably those that have matured since blossom time of the previous season. Succeeding buds spring from the felted slots of tubercles with immature spines, and finally from embryonic tubercles represented by little felted ridges, together with the incipient spines; but there always remains a small, densely felted circle $\frac{1}{2}$ inch in diameter or less, in the center of the crest, from which no buds emerge. This fact is not apparent until one has dissected a plant or removed the central buds, for the crests usually appear to be completely covered by a

crowded mass of ovaries, flowers and buds.

The attractive rose-madder flowers of *Echinomastus erectocentrus* usually have centers that are a deeper shade of the same color, but in one remote region all centers are brown-pink, which makes a lovely combination.

Two years ago I found growing over a large territory in Yuma County, Arizona, what I thought was a new species of cacti, although I had seen neither flowers nor fruit. These plants get to be 16 inches tall or more, and from 4 to 6 inches in diameter, and are thus inclined to be cylindric rather than globose like our local *Ferocactus johnsonii*, which they strongly resemble on casual inspection.

I collected a number of these plants and distributed them to three noted cactus fanciers, who finally reported my supposedly new cactus to be a yellow flowered *Ferocactus johnsonii*. I remained skeptical about their decision until this spring (1933) when I made a special trip to see these cacti in flower.

Imagine my astonishment and delight to find that these plants have all the peculiarities of structure shared and inconspicuously displayed by both *Echinomastus intertextus* and *Echinomastus erectocentrus*, i. e., low ribs composed of tubercles with twisted lobes and short, felted grooves, together with flowers, canary yellow or paler with maroon centers, 2½ inches long and 2 inches across, that closely resemble those of *erectocentrus* except in color.

The blossoms, which open and partially close for 7 successive days, appear during April and May, which is the time that the other two species flower, and in the identical manner: first from the youngest mature tubercles, thence inward toward the center of the crest where the same small circle is left inviolate.

And the similarity extends further, for all three species share the characteristic of having a very limited vertical range of about 300'; around 5200' for *Echinomastus intertextus*, 3200' for *E. erectocentrus* and 1600' for the new (?) plant which evidently belongs in genus *Echinomastus* instead of *Ferocactus* as hitherto classified. For this cactus, whether it proves to be a distinct species or merely a sub-species, I would suggest the name *Echinomastus arizonica*, for it is most annoying to have the Utah tail wag our Arizona dog.

The bristling array of stout spines on the new *Echinomastus*, like those on our *F. johnsonii*, come in several colors: from maroon to pale grayish-lavender when dry to maroon when wet, through pinkish to "blonde" or pale

yellow.

The real *Ferocactus johnsonii* in Arizona begins flowering at least two weeks earlier than our new cactus and finishes that much sooner and has a vertical range of 800' or more, between 1000' and 2000'.

The following tables of the comparative percentages of the radial and central spines per areole on the two similar species was computed from actual counts of spine clusters from many plants of both species.

NEW CACTUS

10 radials	35%
11 radials	30%
12 and 13 radials.....	each 15%
14 radials	5%
4 centrals	60%
5 centrals	30%
6 and 7 centrals.....	each 5%

ARIZONA'S *F. johnsonii*

13 radials	30%
15 radials	20%
8, 10, 11, 12 and 17 radials.....	each 10%
8 centrals	30%
7 centrals	20%
6, 9, 10, 12 and 13 centrals.....	each 10%

The number of spines per areole is thus seen to be variable in both species, but extremely so on *Ferocactus johnsonii*.

There is strong evidence to support the view that *Ferocactus uncinatus* really belongs to the genus *Echinomastus*, for it has, in accentuated form, all the peculiarities of structure, described above as common features of the other 3 species.

Britton and Rose say of *Ferocactus uncinatus*: "This species is doubtfully included in the *Ferocactus*, for it is not closely related to any of those described above. Technically it is different from all the other species in having the tubercles grooved on the upper side and the flower borne at the opposite end of the groove from the spine-areole.* It might be better to segregate it as a generic type." And again: "This species in its short groove above the spine-areole with its sessile gland suggests a relationship with some of the *Coryphanthanae*."

Had these observers studied Arizona's members of the genus *Echinomastus* as exhaustively as they did *Ferocactus uncinatus* it is reasonable to believe that they would have harbored no doubts about its proper genus.

*The italics were indicated by the author.

The following 8 pages are reprinted from "The Cactaceae" by N. L. Britton and J. N. Rose.

A Contribution to the Knowledge of the Cacti of Mexico, Part III.*

(Translation of an article in Vol. II, No. 1, of the "Annals of the Institute of Biology" of the University of Mexico.)

Notes on the Histology of the Peyote, *Lophophora williamsii*, Lemaire.

Presented at the Ninth National Medical Congress.

By HELIA BRAVO, H., of the Biological Institute

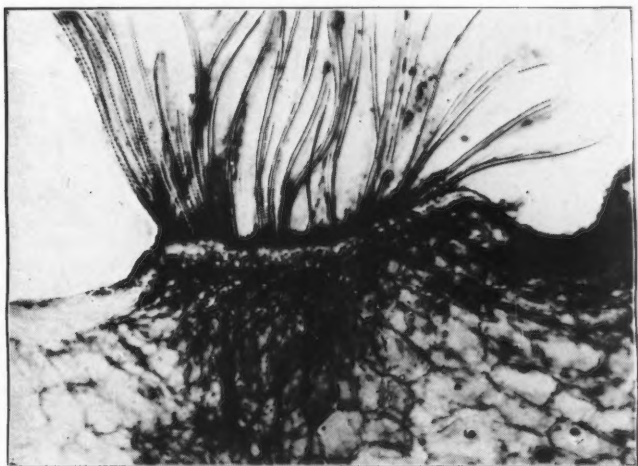


FIG. 6. Microphotograph of a part of the longitudinal section of an areole, showing the beginning of the formation of the hairs making up the plant's wool.

Below the epidermis there is layer made up of cubical cells, free from vacuoles and chloroplasts; many of them contain crystals of calcium oxalate. This tissue, which Rouhier calls by the name of hypodermis, is only found in the epigeal (above the ground) portion of the stem, and, near the hypogeal region begins to transform progressively, at the same time as the epidermis, into a corky tissue.

Immediately below the hypodermis is the cortical chlorophyllan parenchyma, formed of more than 12 layers of prismatic cells which measure 124 microns long by 83 microns in diameter; the general structure of this tissue resembles that of leaves and serves the same purpose; the cells have thin walls, abundant

protoplasm, are provided with vacuoles which contain mucilage; the chloroleucites are arranged vertically, in the periphery of the cells, and many of them form masses around the nucleus; studied under an oil immersion lens it was learned that they are made up of a colorless membrane within which are grains of chlorophyll, elongated or spherical; besides the chloroleucites, there are other minute granules in the protoplasm whose function is not known to us; possibly they pertain to the cellular chondriosomes; in the cuts which we have studied have been found a few grains of starch.

This tissue passes by gradual transitions to another parenchyma made up of large spherical cells; it is the round parenchyma that occupies the greater part of the epigeal stem; its elements contain large quantities of hygroscopic

(Parts I and II appeared in Volume IV, Nos. 10 and 11 respectively of this JOURNAL.)

mucilage which may be easily seen with ruthenium red; the nucleus is round, central or periferal, having a nucleolus in which may be seen, as in the greater part of nucleolus of the

diameter; viewed under an oil immersion lens, they present a refractive substratum that is easily dyed with eosine; in the center they have an inclusion resembling a globoid of

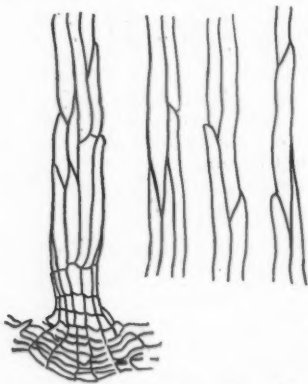


FIG. 7. Drawing of a hair of the Peyote.

Cactaceae, a spherical corpuscle less colored than the rest of the nucleolus; in the protoplasm may be distinguished concretions of calcium oxalate which become larger and more numerous as the cells are deeper in the plant; there are also chloroleucites, but in fewer number than in the chlorophyllan parenchyma, and also irregularly placed there are leucoplasts around the nucleus; some of the inclusions that are found in this tissue and which appear in large quantity in the hypogeal stem and in the root are some corpuscles very much resembling grains of aleurone; spheres of 28 microns in

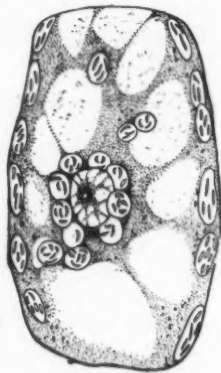


FIG. 9. Drawing of a live cell of the chlorophyll parenchyma (fleshy portion), provided with chloroleucites.

aleurone and within it may be seen, almost always, a crystal of calcium oxalate.

This parenchyma is pierced by numerous rays which go out of the vascular zone and which continue to the chlorophyllan parenchyma; many of them continue on to terminate in the areoles; the fibers which begin in the vascular zone are thick, but as they progress towards the chlorophyllan parenchyma they suffer successive dichotomous divisions and become more and more slender; they are formed by spiral veins of different diameters, and of bast fibers, be-

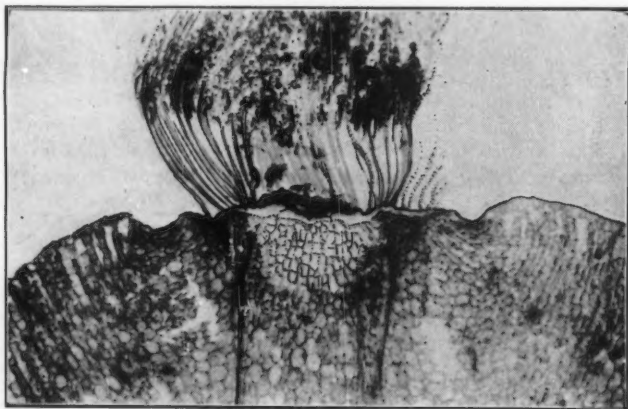


FIG. 8. Microphotograph of a longitudinal section of a tubercle, showing a part of the chlorophyll parenchyma.



FIG. 10. Microphotograph of the round parenchyma, greatly magnified, in which may be seen granules resembling grains of aleurone.

tween them are parenchymatous cells, very large and lengthened, with nuclei also lengthened. The bast and woody fibers always make a single system and are never found independent.

The fibres which penetrate to the tubercles and which terminate in an areole, are arranged

in two concentric lines.

The hypogaeal stem is made up of the cortex, phloem or bast, cambium, wood, and medulla or pith.

The cortex has several layers of dead cells with suberized (corky) walls which easily flake off and which make up the corky scales; below them is the cortical parenchyma, which is thick near the epigeal stem, but as it nears the root becomes decreasingly thick; almost always the cells contain concretions of calcium oxalate in more or less large quantities.

The phloem is formed of sieve tubes, very dense, intermixed with parenchimatous cells.

The generatrix zone has 3 or 4 cellular lines and consists only of woody bast fibers.

The wood forms a zone of variable thickness, near the epigeal region it is weak but as it nears the root it becomes thickened by the apposition of new veins; these are annulated or spiraled; showing a wide strip spiraled inside a thin walled tube, the spiral may be more or less compressed. Among these veins there are near the wood, tracheids, spirals which form groups of six. The bundle after following a short path branches off, one half of the tracheids going to one side, and the other half

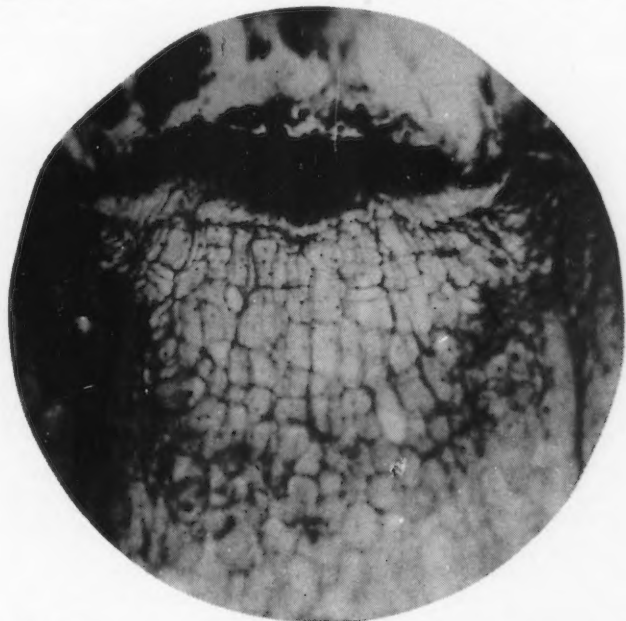


FIG. 11. Microphotograph of a transversal cut of a tubercle, at the surface of the areole, showing the ending of the vascular bundles.

towards the opposite side; both halves become united and make a new bundle with tracheids originating in the bifurcation of another bundle; in this manner is formed, near the medulla, a cascular skeleton which, besides performing its own functions, gives solidity to the stem. The spaces which are free of the bundles of tracheids are filled with cells that come out of the pith.

The medulla of this portion of the stem is made up of large cells of polygonal outline; the medullary rays are of 1 to 3 lines; both the medulla and the medullary rays contain crystals of calcium oxalate and these are so numerous that they make it difficult to obtain histological slides; in cells of this tissue are also found, in quantity, the granules that resemble aleurone, those that we have already referred to in describing the round parenchyma.

It is very difficult to determine the region where the stem ends and the root begins; longitudinal and transversal cuts taken at various elevations show analogous structure. This fact may only be explained if one takes into account the distribution of the tissues of the secondary root and of the stem, it is analogous, and it is the same in the first as in the second—the same texture in the bast fibres and in the secondary wood.

In the secondary roots may be distinguished



FIG. 12. Microphotograph that shows a part of a transversal cut of the hypogeal stem.

the cordy tissue formed by a variable number of cellular layers which easily flake off; in slides of very tender roots, in place of a corky tissue, is seen an epidermis covered with absorbent pubescence; the outer cortical layers which are beneath this tissue are in two or three

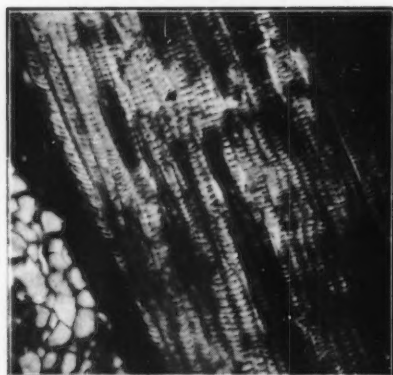


FIG. 13. Microphotograph of a vascular bundle of the hypogeal stem.

lines of large cells, polyhedric, with walls also suberized; the inner cortical layers have tiny quadrilateral cells, compressed tangentially; their membranes are thin and do not take dyes like hematoxilin, fuchsin, etc., neither are they impregnable with the salts of silver; in both layers the cells have died and only in the tender roots conserve their vitality; a string of living cells, prismatic, which may be identified as endoderm separates at the cortex of the central cylinder. The cellular layers beneath this are of

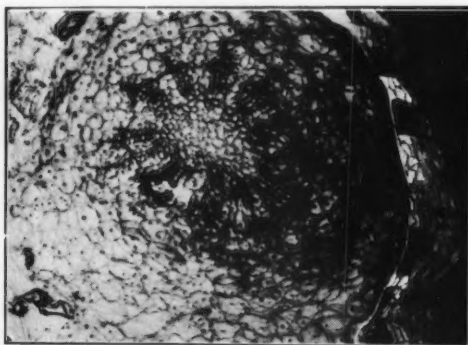


FIG. 14. Transversal cut of a secondary root: note the disposition of the phloem and of the wood.

the pericycle.

The vascular system is made up of a variable number of woody bast bundles (5-8-11) with the phloem towards the outside and the woody bundles towards the inside, in the middle of them the cambium; among the medullary rays

are found isolated woody veins which correspond to the primary bundles. The disposition of the vascular system in the root of these plants, which more than resembles the constitution of the stem, we have found even in very tender roots, still covered with absorbent pubescence. Certainly this phenomenon is due to the fact that the cambium which forms the secondary structure begins to differentiate very early. (Figures 14 and 15.)

The medulla of the principal root scarcely exists, because it has been invaded by the woody fibres. A tissue made up of spherical cells which contain concretions of calcium oxalate forms the tender roots; the medullary rays are made up of 2-3 lines of small cells which also contain concretions of this same salt.

BIBLIOGRAPHY

- ANALES DEL INSTITUTO MÉDICO NACIONAL DE MEXICO. Vol. IV: p. 205; V: pp. 131, 134, 142, 145, and 195.
 BERGER, A.—Kakteen. 1929.
 BRITTON AND ROSE—The Cactaceae. Vol. III, p. 83, 1922.
 COULTER, J. M.—Preliminary Revision of the North American species of Cactus Anhalonium and Lophophora. Contribution from the U. S. National Herbarium. Vol. III: pp. 91-132. Washington, 1894.
 DE BARRY, A.—Comparative Anatomy of the Phanerogam and Ferns. Oxford, 1884.
 DIGUET, L.—Les Cactées Utiles du Mexique. Paris, 1928.
 LABOURET, J.—Monographie de la famille de Cactées. Paris, 1853.
 McCLUNG—Handbook of Microscopical Technique. New York, 1929.
 PUJULA, L.—Histologia, Embriologia y Anatomia Microscopica de los Vegetales. Barcelona, 1921.
 RAMIREZ, L.—El Peyote—Anales del Instituto Médico Nacional de Mexico. Vol. IV: p. 233.
 ROUHIER, A.—Le Peyotl. Paris, 1927.
 SCHUMANN, K.—Cactaceae—Die natürliche Pflanzenfamilien. Leipzig, 1894.
 THOMPSON, C. H.—The Species of Cacti Commonly Cultivated under the Generic Name Anhalonium, Ninth Annual Report of Missouri Botanical Garden. pp. 127, 135.
 URBINA, M.—El Peyotl y el Ololihuqui. La Naturaleza. Vol. I. 1st Series.
 VAN THIEGHMEN—Traite de Botanique.
 ZIMMERMAN, A.—Botanical Microtechnique. New York, 1901.

FRICK'S NOTES

One hundred and forty-nine old shoes found recently in a prehistoric cave in Val Verde County, Texas, by Prof. J. E. Pearce and A. T. Jackson, two University of Texas archaeologists, inform us that these shoes were made sandal fashion and constructed of fiber from the yucca plant. It is estimated that these shoes were worn a thousand years before Columbus discovered America.

We little realized that our note in the October issue stating where *Cephalocereus senilis* was selling at 5c each would be taken as an advertisement instead of news as we intended it. From the number of requests received for the address of that grower, it appears that *C. senilis* and *C. trollii* are very much in demand at that price. We are pleased to announce that this grower has now signed the California N.R.A. code and the same plants today are in line with regular cactus dealers' prices.

According to Ornithologist, Wright Pierce, the Cactus Wren was so named because it builds its nest in Cacti; yet he observed one wren that built its nest on a telephone pole. This, in accord with ornithological nomenclature, naturally makes that bird a Polish Wren.

Be patient, folks, there are but eight more instalments of the reprint of Volume one of the Cactaceae.

BOTANICAL NOTES

Since becoming interested in The Cactaceae about a year ago, I have found it necessary to review my botany, as I am an old graduate of the Royal Botanic Gardens, London, Eng. The other day I came across some old notes from lectures in 1921 and am passing them on to you:

ADAPTMENT OF PLANTS TO ENVIRONMENT

"Maritime plants, usually possess fleshy leaves, thick cuticle, sunken stomata, dense coat of hairs, wax or salt crystals, all to prevent excessive transpiration, from exposed situation and saline atmosphere. Root system greatly developed, because growing in sand, or sandy soil, water sinks rapidly. Frequently stems, branches and leaves are all thick and succulent, and identical with except for position as saltwort.

"Desert plants closely resemble maritime with similar means to prevent transportation. In both cases all of parenchyma are filled with mucilage which holds water, and vascular bundles are always near centre. Their respiration differs owing to their habitat, they possess few stomata. The amount CO₂ received is smaller, hence it is necessary that little should be lost. In respiration especially at night, free organic acids, usually malic C₈ H₁₁ O₈ are formed. These are decomposed in light with evolution of Oxygen, and a production of starch. What happens is that under influence of light, the acid undergoes further oxidation, the CO₂ produced being immediately assimilated. It is of great importance to fleshy plants that as little CO₂ should be lost during the night as possible, and that it should be preserved in form of non volatile organic acids for assimilation during day time."

A. W. FLACK.

A volume of the BALTIMORE CACTUS JOURNAL, published in 1894, contains two items that explain the reason for its short existence. The announcement on the first page informs the cactus loving world of that day, that the subscription price was 25c per year, or five subscriptions for \$1.00. In a later issue we find the report of the secretary as follows: "At a recent meeting of the Baltimore Cactus Society it was decided that they as a body would discontinue the publication of the BALTIMORE CACTUS JOURNAL, several of the members volunteering to assume the indebtedness."

What Grows Where

Cacti Listed in Accordance With Their Geographical Origin

Compiled and Copyrighted for Mrs. John D. Wright, Santa Barbara, Calif., 1933

By ANNE SMITH

NEVADA

OPUNTIEAE TRIBE

SUBGENUS CYLINDROPUNTIA

Ramosissimae Series

O. ramosissima

Type Locality: In California, near the Colorado River.

Distribution: Southern Nevada, western Arizona, southeastern California, northwestern Sonora and probably northeastern Lower California.

Echinocarpae Series

O. acanthocarpa

Type Locality: On the mountains of Cactus Pass, Arizona, about 500 miles west of Santa Fe, New Mexico.

Distribution: Arizona and California; reported also from Utah, Nevada, and Sonora.

O. echinocarpa

Type Locality: In the Colorado Valley near the mouth of Bill Williams River.

Distribution: Nevada, Utah, Arizona, California, and Lower California.

Bigelovianae Series

O. bigelovii

Type Locality: Bill Williams, Arizona.

Distribution: Southern Nevada, Arizona, California, northern Sonora, and northern Lower California.

Clavatae Series

O. parishii

Type Locality: Mojave Desert.

Distribution: Southern California and Nevada.

O. pulchella

Type Locality: Sandy deserts on Walker River, Nevada.

Distribution: Nevada and Arizona.

SUBGENUS 3. PLATYOPUNTIA

Basilares Series

O. basilaris

Type Locality: From Cactus Pass down the valley of the Bill Williams River.

Distribution: Northern Sonora, western Arizona, southern California, Nevada, and southern Utah.

Dillenianae Series

O. chlorotica

Type Locality: On both sides of the Colorado from San Francisco Mountains to headwaters of Bill Williams River.

Distribution: Sonora and New Mexico to Nevada, California, and Lower California.

O. curvospina. GRIFFITHS—Bull. Torr. Club, 43, p. 88, 1916.

Type Locality: Collected near Nipton, California, and Searchlight, Nevada.

Distribution: Widely distributed in the California, Nevada, Arizona deserts.

Polyacanthae Series

O. erinacea

Type Locality: On Mojave Creek, California.

Distribution: Northwestern Arizona, southern Utah, southern Nevada, and eastern California.

O. bystricina

Type Locality: Colorado Chiquito and on San Francisco Mountains.

Distribution: New Mexico to Arizona and Nevada.

CEREEAE TRIBE

SUBTRIBE 3. ECHINOCEREANAE

Echinocereus

E. mojavenis

Type Locality: On the Mojave River in California.

Distribution: Southeastern California to Nevada and Utah, western Arizona, and reported from northwestern Mexico.

E. engelmannii

Type Locality: Mountains about San Felipe, southern California.

Distribution: California, Nevada, Utah, Arizona, Sonora, and Lower California.

SUBTRIBE 4. ECHINOCACTANAE

Pediocactus

P. simpsonii

Type Locality: Butte Valley in the Utah desert and Kobe Valley, further west.

Distribution: Kansas to New Mexico, north to Nevada, Washington, Idaho, and Montana.

Ferocactus

F. acanthodes

Type Locality: California.

Distribution: Deserts of southeastern California, northern Lower California and southern Nevada.

F. johnsonii

Type Locality: Near St. George, Utah.

Distribution: Northwestern Arizona, eastern California, western Utah, and southern Nevada.

F. lecontei

Type Locality: Lower parts of the Gila in western Arizona.

Distribution: Southern California along the Colorado, northern Lower California, Sonora and east into Utah and Arizona. The geographic limits of the species are ill-defined.

Echinocactus

E. polycephalus

Type Locality: On the Mojave River, California.

Distribution: Nevada, Utah, western Arizona, southern California to northern Sonora; reported from Lower California.

Sclerocactus

S. polyancistrus

Type Locality: At the head of the Mojave River, California.

Distribution: Deserts of California and Nevada; reported from western Arizona.

SUBTRIBE 6. CORYPHANTHANA

Coryphantha

C. chlorantha

Type Locality: Southern Utah, east of Saint George.

Distribution: Southern Utah, western Arizona, central Nevada, and eastern southern California.

C. deserti

Type Locality: Ivanpah, California.

Distribution: Deserts of southern California and southern Nevada.

Phellosperma

P. tetrandicentra

Type Locality: San Felipe, California.

Distribution: Western Arizona, southeastern California, southern Utah, and southern Nevada; probably northern Lower California.

The newly finished national highway just opened to travel from Argentina to Chile, taps the Quebrada del Toro section, which has been explored very little by botanists and is known as the Cactus Empire since it is the greatest section of these two countries for the study and collecting of cacti. Now that this district is open to auto travel, we may look forward to the introduction of many new species in the near future. The altitude being from 2500 to 4000 meters above sea level, it is possible that the *Cephalocereus* group will be increased in number.

* * *

Here is a stimulant for our more fortunate Florida and California collectors that do not appreciate their climate. The following letter is from member Mathew McLean of Toronto, Canada. "I have had the misfortune to lose about 250 species of cactus by the bursting of a steam pipe in my hot house; but it did not burst my enthusiasm for cacti and I expect to have the plants all replaced in another year.

* * *

Seedling price lists received this month were from Eugene R. Ziegler, Spencerport, N. Y. Free.

Phyllocactus, Rhipsalis and Epiphyllums on account of their slender growth, require a little moisture occasionally to sustain them during the rest periods, while the globular sorts may be carried over the winter months without watering at all.

* * *

Neel Worms in Australia are nothing more or less than our American nematode, declares member D. T. Hinchin, of Sydney, who was a visitor at headquarters last month.

* * *

Prof. M. M. Evans and J. G. Brown of the University of Arizona, report that the *Carnegea gigantea* are afflicted with plant tumors called "crown gall," a tumorous growth caused by bacteria, that afflicts many species of plants. Some of these growths on the *gigantea* become very large and one found attached to the root of a huge cactus, by a short stalk, had a diameter of ten inches and weighed eight and one half pounds. As evidence against the theory that crown gall was introduced by pioneer Spanish missionaries from other countries, was proven by Prof. Brown in the discovery of these gall-afflicted cacti in areas far from human cultivation, present or past.

PATRONIZE JOURNAL ADVERTISERS AND PLEASE MENTION THAT YOU SAW THEIR AD IN THE JOURNAL

CACTUS JOURNAL, unbound copies Vols. I, II, III, and IV. A member of the Society desires an offer. Address The Editor, 6162 N. Figueroa Sts., Los Angeles, Cal.

1934 Cactus and Succulent **SEED LIST** is now ready for distribution. It offers a selection of 1100 species, many rare; many of which I have the sole supply; and some of the better known sorts. I believe this to be the finest assortment in the world and marked to meet present day prices. List mailed free. Write now while the selection is complete. Order now my "Monatsblätter fuer Kakteenforschung," 12 numbers for 4.20 Rm. (Marks) postpaid. Text in English. The best in cactus literature of 1934. **CURT BACKEBERG**, Kakteen Garden, Volsdorf, Bez. Hamburg, Germany.

THANK YOU for your business the past year. Let us continue to supply you with Cacti. Can supply in any quantities desired. Experienced exporters, cable address, Davis, Marathon, Texas. Reference. The First National Bank, Alpine, Texas. Write for price list of Cacti and Seeds. **A. R. DAVIS**, P. O. Box 167, Marathon, Texas.

Eight big strong **LOWER CALIFORNIA SEEDLING** Cactus plants for \$2.00 delivered. **HOWARD GATES**, 117 S. Illinois St., Anaheim, Calif.

Special this month. 8 named **KALANCHOES** postpaid, \$1.00. Natives to Madagascar. **KNICKERBOCKER NURSERY**, R. 1, San Diego, Cal.

CACTUS AND ROCK GARDEN PLANTS—From Texas' largest collection. Lists wholesale and retail, also seeds. **SHINER CACTUS NURSERY**, Box 2, Laredo, Texas.

ZYGOCACTUS (Christmas or Crab-claw Cactus)—orange, salmon, peach, and combination red-and-white. Now in bloom at **CACTUS PETE'S** new location, 5440 Valley Blvd., L. A.

5 GOOD EUPHORBIAS \$1.00
RIMROCK CACTUS GARDENS
2430 Edgewater Terrace, Los Angeles

SPECIAL PRICES on released imported cactus crests, Euphorbias, Stapelia tribes, S. America and Mexican cactus blooming sizes. Also succulents, seeds and seedlings. **McCABE CACTUS FARM**, 6721 Imperial, Rt. 3, San Diego, California.

CACTUS CULTURE

This is the most up-to-date, practical and comprehensive book published on the culture of Cacti. The most experienced as well as the beginner will find in this book suggestions which will prove both profitable and interesting. 186 pages 5½x8 with fabrikoid binding. Price \$2.00. Cactus & Succulent Society of America, 1800 Marengo St., Los Angeles, Calif.



THE CACTUS BOOK

by
A. D. Houghton

From this book you will learn the secrets of successful watering, how to grow Cacti from seeds, how to propagate the rare species by grafting, how to hybridize, how to grow indoors in pots, and on window sills, how to purchase and trade to get new sorts and what kinds to grow for different effects. Also introduces you to more than 1,000 different kinds of Cacti with information for selecting the types you need for every purpose and location.
Price \$2.25 Postpaid

Cactus & Succulent Society of America
1800 Marengo Street
Los Angeles, Calif.

Ornamental gourds, single or in colorful Mexican strings, and artistic bowls of succulents.

CLARK GARDENS

1250 S. Fair Oaks, Pasadena

SPECIALS

Six greenhouses full of bigger and better succulents and cactus from which to choose. List free.

Wholesale a specialty.

E. P. BRADBURY

542 N. Mango Ave., Fontana, Calif.

If you wish to buy at low prices beautiful Cactus plants, please write for our catalogue. It contains more than 200 different kinds. Please write to **SCHWARZ & GEORGI**, Cactus Specialists, Apartado No. 7, San Luis Potosi, S. L. P., Mexico, remitting 15 cents in stamps.



BOUND VOLUMES of the Cactus Journal, Vol. I, II, III, and IV, are now on sale; these will be very valuable before many years, so take advantage of the opportunity at this time. Volume I \$9.00, Volumes II, III and IV at \$6 each. Unbound copies Vol. II, III and IV \$3.50 each. **CACTUS AND SUCCULENT SOCIETY**, 1800 Marengo St., Los Angeles, Calif.

THE STAPELIEAE

By Alain White and Boyd L. Sloane
The most complete and up-to-date monograph on Stapelias, 224 pages, 8 x 11 with 250 illustrations. Printing and binding are the best that can be secured. An ideal Christmas gift. Orders filled now, \$3.00

White and Sloane Stapelia Collection
1421 Dominion Ave., Pasadena, Calif.

INTERESTING CACTI!

Write for our new fall catalog of Cacti and Succulents. We have tens of thousands of interesting new seedlings at most reasonable prices. *Oreocereus Trolii*, *Cephalocereus* in numbers, *Mam. Hahniana*, *M. bocasana*, *Creeping Devil*, *Haworthias*, *Crassulas*, *Mesemb.*, etc. Have you received your Free copy of our 32-page color catalog?

JOHNSON WATER GARDENS

Box P Since 1876 Hynes, Calif.

SPECIAL HOLIDAY OFFER

6 named, fascinating cactus seedlings \$1.00 postpaid. Thousands of seedlings of the rarer exotic *Cerei*, *Neomams*, and *Echino-cacti*. Wholesale and retail.

Visitors Welcome at

Wright M. Pierce Gardens

313 W. 3rd St., Claremont, Calif.

"Conserve Our Deserts by Buying Seedlings"

